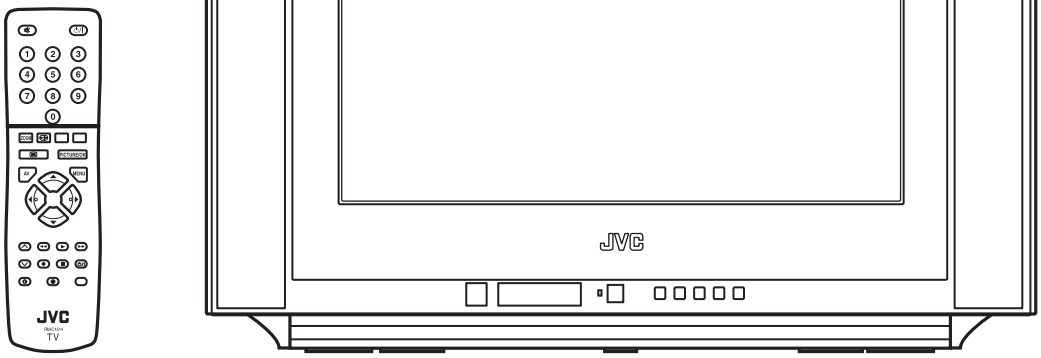
JVC

SERVICE MANUAL

COLOUR TELEVISION

AV-28EH1SUG



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No.52172
2003/7

SPECIFICATION

Item		Content
Dimensions (W × H × D)		76.0cm × 58.9cm × 47.5cm
Mass		32.3kg
TV RF System		CCIR (B/G, D/K, I , L/L')
Colour System		PAL / SECAM / NTSC (Only in EXT mode)
Stereo System		A2 (B/G, D/K) / NICAM (B/G, I, D/K, L)
Teletext System		FLOF (Fastext) TOP (German system) WST(World standard system)
Receiving Frequency	VHF	47MHz ~ 470MHz
	UHF	470MHz ~ 862MHz
	French CATV	116MHz ~ 172MHz / 220MHz ~ 469MHz
Intermediate Frequency	VIF Carrier	38.9MHz (B/G, D/K, I , L) / 33.95MHz (L')
	SIF Carrier	33.4MHz (5.5MHz:B/G) / 32.9MHz (6.0MHz:I) / 32.4MHz (6.5MHz:L, D/K) / 40.45MHz (6.5MHz:L')
Colour Sub Carrier Frequency	PAL	4.43MHz
	SECAM	4.40625MHz / 4.25MHz
	NTSC	3.58MHz / 4.43MHz
Power Input		AC220V ~ AC240V, 50Hz
Power Consumption		74W, standby : 3W
Aerial Input Terminal		75Ω unbalanced, coaxial
Picture Tube		Visible size : 66cm (Measured diagonally)
Audio Power Output		7W + 7W
EXT-1 / EXT-2 (Input / Output)		21-pin Euro connector (SCART socket × 2)
EXT-3 (Input)	Video	1V(p-p) 75Ω (RCA pin jack × 1)
	Audio (L/R)	500mV(rms) (-4dBs), High impedance (RCA pin jack × 2)
Headphone Jack		Stereo mini jack (Ø3.5mm) × 1
Remote Control Unit		RM-C1514 (AAA/R03 dry battery × 2)

Design & specifications are subject to change without notice.

SECTION 1
PRECAUTION

1.1 SAFETY PRECAUTIONS

(1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

(2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

(3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual**. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.

(4) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : (⊥) side GND, the ISOLATED (NEUTRAL) : (⏚) side GND and EARTH : (⏚) side GND.
Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time with a measuring apparatus (oscilloscope etc.). If above note will not be kept, a fuse or any parts will be broken.

(5) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See B1 POWER SUPPLY check).

(6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.

(7) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10kΩ 2W resistor to the anode button.

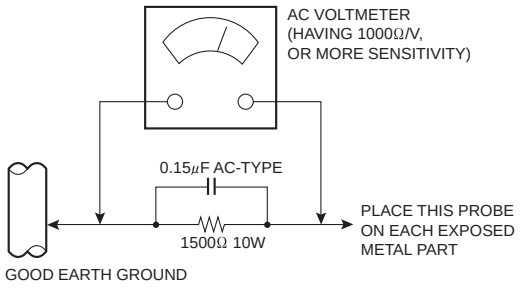
(8) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(9) **Isolation Check (Safety for Electrical Shock Hazard)**
After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) **Dielectric Strength Test**
The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (. . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)
This method of test requires a test equipment not generally found in the service trade.

b) **Leakage Current Check**
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

Alternate Check Method
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000Ω per volt or more sensitivity in the following manner. Connect a 1500Ω 10W resistor paralleled by a 0.15μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



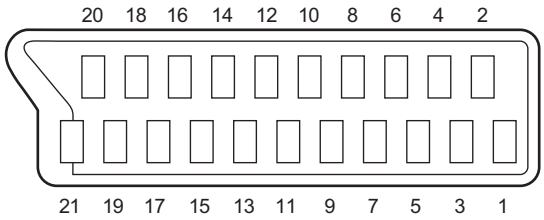
SECTION 2
SPECIFIC SERVICE INSTRUCTIONS

2.1 21-pin Euro connector (SCART) : EXT-1/EXT-2

Pin No.	Signal designation	Matching value	EXT-1	EXT-2
1	AUDIO R output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)
2	AUDIO R input	500mV(rms) (Nominal), High impedance	Used (R1)	Used (R2)
3	AUDIO L output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)
4	AUDIO GND		Used	Used
5	GND (B)		Used	Used
6	AUDIO L input	500mV(rms) (Nominal), High impedance	Used (L1)	Used (L2)
7	B input	$700mV_{(B-W)}$, 75 Ω	Used	NC
8	FUNCTION SW(SLOW SW)	Low : 0V-3V High : 8V-12V, High impedance	Used	NC
9	GND (G)		Used	NC
10	SCL / T-V LINK		Not used	NC
11	G input	700mV(B-W), 75 Ω	Used	NC
12	SDA		Not used	NC
13	GND (R)		Used	Used
14	GND (YS)		Used	Used
15	R / C input	R : $700mV_{(B-W)}$, 75 Ω C : $300mV_{(P-P)}$, 75 Ω	Used (R)	Used (C)
16	Ys input (FAST SW)	Low : 0V-0.4V High : 1V-3V, 75 Ω	Used	NC
17	GND (VIDEO output)		Used	Used
18	GND (VIDEO input)		Used	Used
19	VIDEO output	$1V_{(P-P)}$ (Negative sync),75 Ω	Used (TV OUT)	Used (LINE OUT)
20	VIDEO / Y input	$1V_{(P-P)}$ (Negative sync), 75 Ω	Used	Used
21	COMMON GND		Used	Used

(P-P= Peak to Peak, B-W= Blanking to white peak)

[Pin assignment]



SECTION 3
DISASSEMBLY

3.1 DISASSEMBLY PROCEDURE

3.1.1 REMOVING THE REAR COVER

(1) Unplug the power cord.
(2) Remove the 6 screws **[A]** as shown in the figure.
(3) Withdraw the REAR COVER toward you.

3.1.2 REMOVING THE MAIN PWB

- Remove the REAR COVER.
  (1) Slightly raise the both sides of the chassis by hand and Withdraw the CHASSIS backward.
  (If necessary, take off the wire clamp, connectors etc.)

3.1.3 REMOVING THE SIDE SPEAKER

- Remove the REAR COVER.
  (1) Remove the 2 screws **[B]**, attaching the SPEAKER.
  (2) Follow the same steps when removing the other hand SPEAKER.

3.1.4 CHECKING THE PW BOARD

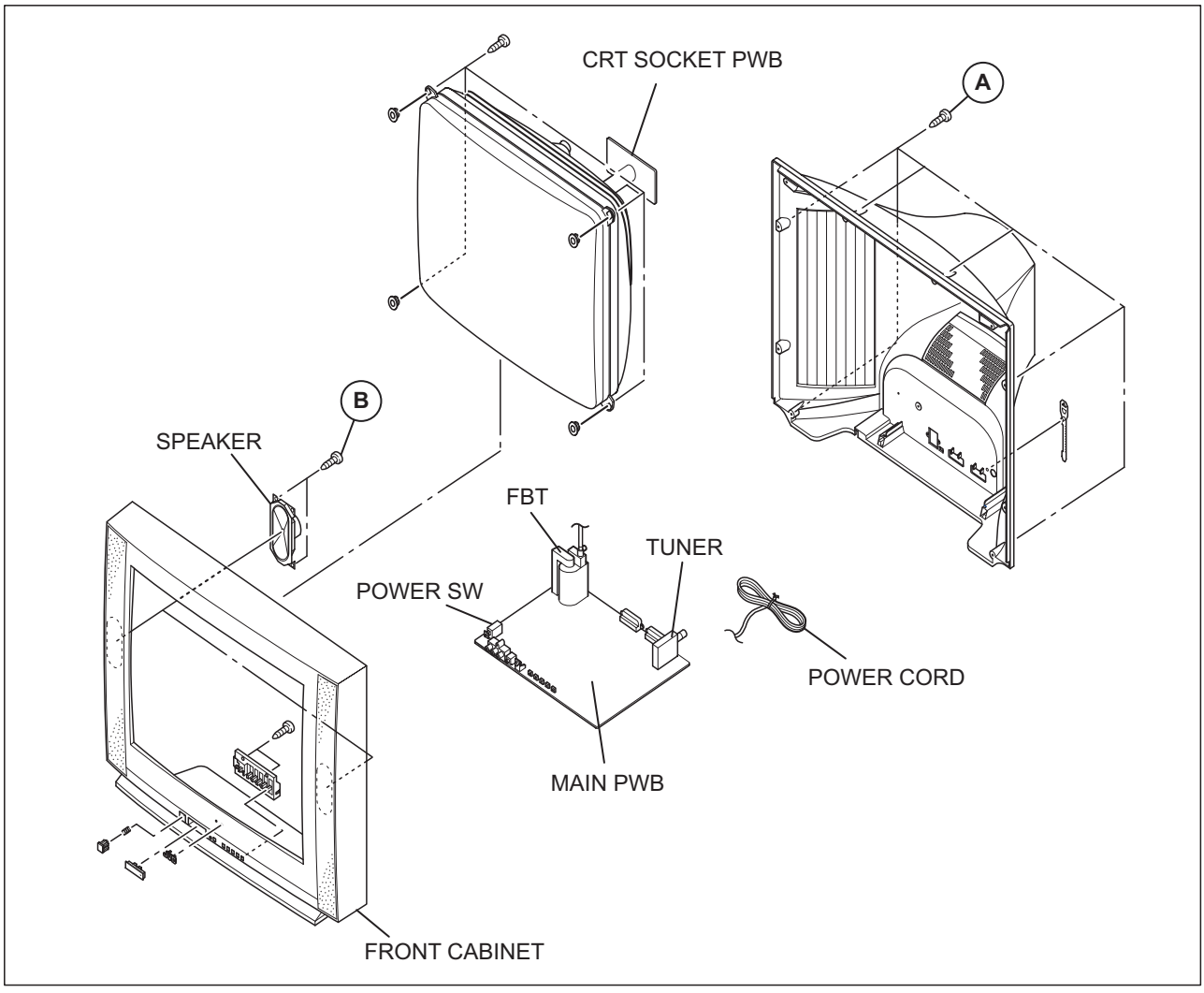
- To check the back side of the PW Board.
  (1) Pull out the CHASSIS. (Refer to REMOVING THE CHASSIS).
  (2) Erect the CHASSIS vertically so that you can easily check the back side of the PW Board.

CAUTION:

- When erecting the CHASSIS, be careful so that there will be no contacting with other PW Board.
- Before turning on power, make sure that the wire connector is properly connected.
- When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PW board.

3.1.5 WIRE CLAMPING AND CABLE TYING

(1) Be sure to clamp the wire.
(2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.



3.2 MEMORY IC REPLACEMENT

3.2.1 MEMORY IC

This TV use memory IC. In the memory IC, there are memorized data for correctly operating the video and deflection circuits. When replacing memory IC with a blanking memory IC, the set is automatically memorized following SERVICE MANU initial data.

3.2.2 MEMORY IC REPLACEMENT PROCEDURE

There are 21 SERVICE ADJUSTMENT ITEMS. After replacing memory IC, automatically memorized following initial data.

No.	Adjustment item	Initial data
1	HOR CEN	-00144
2	RED GAIN	+00380
3	GRN GAIN	+00360
4	BLUE GAIN	+00380
5	RED BIAS	+00256
6	GRN BIAS	+00256
7	AGC LEVEL	+00035
8	G2-SCREEN	+00032
9	AFT	+00032
10	OPTION 1	0011 1100
11	OPTION 2	0100 0010
12	AVL	OFF
13	PARABOLA	+00250
14	HOR WIDTH	-00093
15	CORNER T	-00053
16	CORNER B	+00043
17	HOR PARAL	+00001
18	V. LINEAR	+00005
19	EW TRAPEZ	+00035
20	S CORRECT	+00130
21	VERT CENT	+00008
22	VERT SIZE	+00040

3.2.3 FACTRY SETTING VALUE

3.2.3.1 FRONT BUTTON SETTING AND INITIAL SEETING

Item	Value
MAIN POWER	OFF(SUB POWER ON)
PR POSITION	01
INPUT MODE	TV
LANGUAGE	ENGLISH

3.2.3.2 USER MENU SETTING

Item	Value
PICTURE	
PICTURE SETTING	NOMAL1
NOISE RED	WEAK
SOUND	
VOLUME	18
BALANCE	Center
TREBLE	Center
FEATURES	
CHILD LOCK	OFF
ZOOM AUTO	4:3

3.3 REPLACEMENT OF CHIP COMPONENT

3.3.1 CAUTIONS

(1) Avoid heating for more than 3 seconds.
(2) Do not rub the electrodes and the resist parts of the pattern.
(3) When removing a chip part, melt the solder adequately.
(4) Do not reuse a chip part after removing it.

3.3.2 SOLDERING IRON

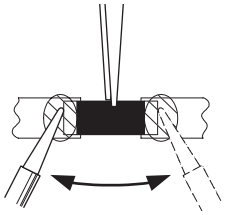
(1) Use a high insulation soldering iron with a thin pointed end of it.
(2) A 30w soldering iron is recommended for easily removing parts.

3.3.3 REPLACEMENT STEPS

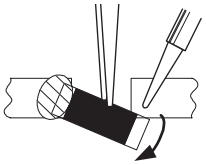
1. How to remove Chip parts

[Resistors, capacitors, etc.]

(1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.

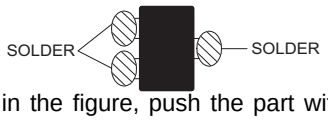


(2) Shift with the tweezers and remove the chip part.

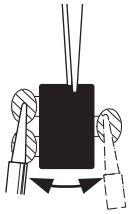


[Transistors, diodes, variable resistors, etc.]

(1) Apply extra solder to each lead.



(2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



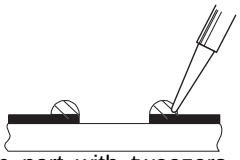
NOTE :

After removing the part, remove remaining solder from the pattern.

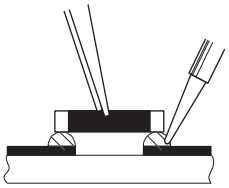
2. How to install Chip parts

[Resistors, capacitors, etc.]

(1) Apply solder to the pattern as indicated in the figure.

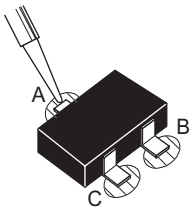


(2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

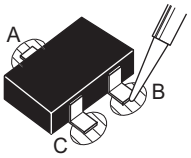


[Transistors, diodes, variable resistors, etc.]

(1) Apply solder to the pattern as indicated in the figure.
(2) Grasp the chip part with tweezers and place it on the solder.
(3) First solder lead **A** as indicated in the figure.



(4) Then solder leads **B** and **C**.



SECTION 4
ADJUSTMENT

4.1 ADJUSTMENT PREPARATION

(1) There are 2 ways of adjusting this TV : One is with the REMOTE CONTROL UNIT and the other is the conventional method using adjustment parts and components.
(2) Make sure that connection is correctly made AC to AC power source.
(3) Turn on the power of the TV and measuring instruments for warning up for at least 30 minutes before starting adjustments.
(4) If the receive or input signal is not specified, use the most appropriate signal for adjustment.
(5) Never touch the parts (such as variable resistors, transformers and condensers) not shown in the adjustment items of this service adjustment.

4.2 MEASURING INSTRUMENT AND FIXTURES

(1) DC voltmeter (or digital voltmeter)
(2) Signal generator (Pattern generator : PAL / SECAM / NTSC)
(3) Remote control unit.

4.3 BASIC OPERATION OF SERVICE MENU

4.3.1 TOOL OF SERVICE MENU OPERATION

Operate the SERVICE MENU with the REMOTE CONTROL UNIT.

4.3.2 SERVICE MENU ITEMS

There are 21 adjustment items.

No.	Adjustment item	No.	Adjustment item
1	HOR CEN	12	AVL
2	RED GAIN	13	PARABOLA
3	GRN GAIN	14	HOR WIDTH
4	BLUE GAIN	15	CORNER T
5	RED BIAS	16	CORNER B
6	GRN BIAS	17	HOR PARAL
7	AGC LEVEL	18	V. LINEAR
8	G2-SCREEN	19	EW TRAPEZ
9	AFT	20	S CORRECT
10	OPTION 1	21	VERT CENT
11	OPTION 2	22	VERT SIZE

4.3.3 HOW TO ENTER SERVICE MENU

(1) Press [i](Information) key and [🔇](Muting) key same time then enter SERVICE MENU.
(2) Adjust sharpness to minimum and exit all menus.
(3) Within 2 seconds press the key sequence [RED]-[GREEN]-[MENU]key.

4.3.4 SELECTION OF MENU SCREEN

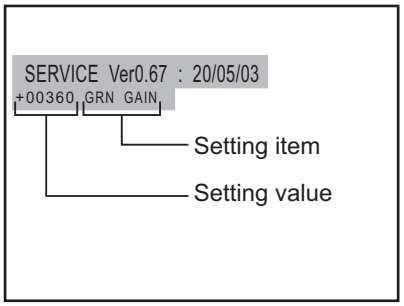
(1) Press [▲] / [▼] keys of the REMOTE CONTROL UNIT and select adjustment item.

4.3.5 SETTING VALUE OF ADJUSTMENT ITEMS

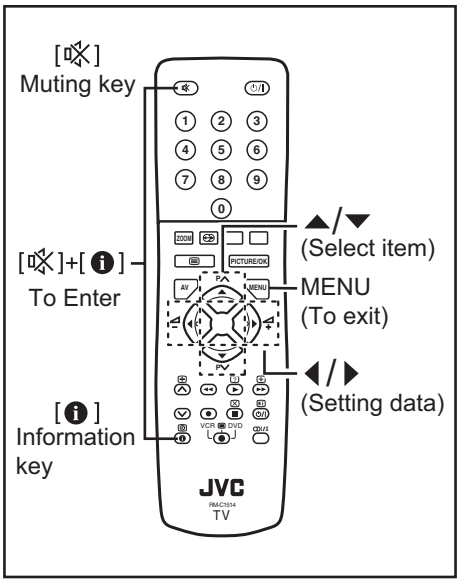
(1) Press [◀] / [▶] keys of the REMOTE CONTROL UNIT and setting value of adjustment items.

4.3.6 HOW TO EXIT SERVICE MENU

(1) Press [MENU] key, then exit SERVICE MENU.



SERVICE MENU SCREEN

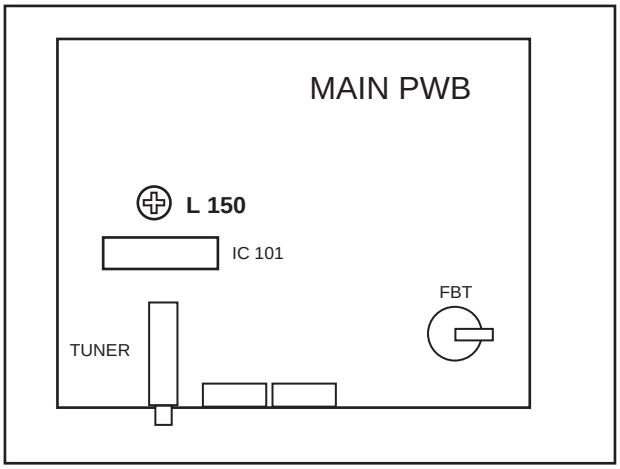


REMOTE CONTROL UNIT KEY

4.4 ADJUSTMENT PROCEDURE

4.4.1 LOCAL OSCILLATOR ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
AFT adjustment	Signal generator Remote control unit		AFT Adjustment coil : L150 [MAIN PWB]	(1) Receive a colour bar pattern signal. (2) The frequency of the signal carrier must be accurate (Max +/-10kHz deviation from the nominal channel frequency). (3) Select < AFT >. (4) Adjust the adjustment coil (L150) to bring the cursor to central poison.

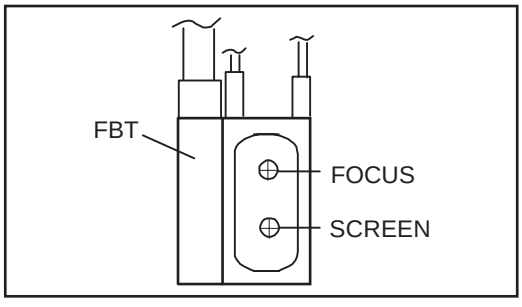


4.4.2 AGC

Item	Measuring instrument	Test point	Adjustment part	Description
AGC adjustment	Signal generator Remote control unit		AGC	(1) Receive a colour bar pattern signal. (2) Select < AGC >. (3) Press the [OK] key and wait until AGC level stabilize to the optimum value.

4.4.3 FOCUS ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
FOCUS adjustment	Signal generator Remote control unit		FOCUS VR [On FBT]	(1) Receive a cross-hatch signal. (2) Adjust the FOCUS volume on the FBT to have the best resolution on the screen.



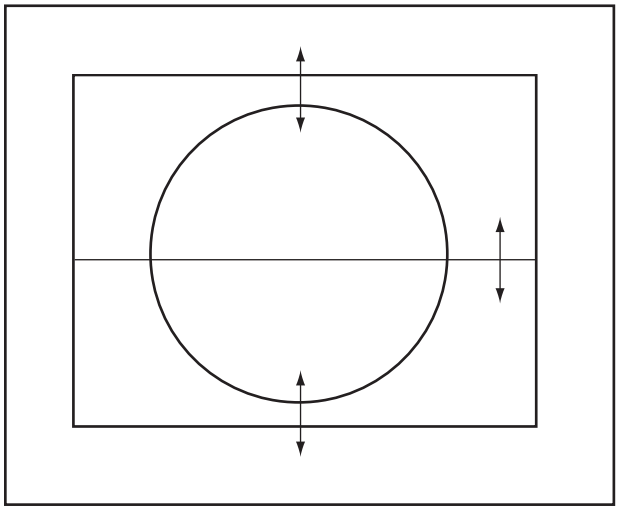
4.4.4 SCREEN ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
SCREEN adjustment	Signal generator Remote control unit			(1) Receive a colour bar pattern signal. (2) Select < G2-SCREEN >. (3) Adjust the SCREEN VR on the FBT to bring the cursor to central position.

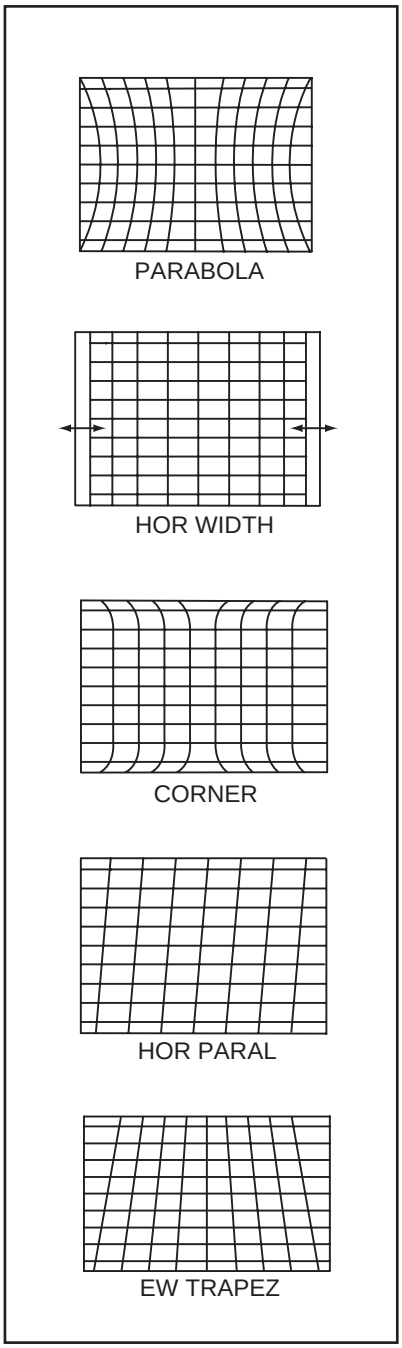
4.4.5 WHITE BALANCE ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE adjustment	Signal generator Remote control unit		RED BIAS GRN BIAS RED GAIN GRN GAIN BLUE GAIN	(1) Receive a black and white pattern signal (colour off). (2) Select < RED BIAS >, < GRN BIAS > and adjust the screen until the black portion in the screen becomes black. (3) Select < RED GAIN >, < GRN GAIN >, < BLUE GAIN > and adjust the screen until the white portion in the screen become white.

4.4.6 DEFLECTION CIRCUIT ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL GEOMETORY adjustment	Signal generator Remote control unit		V. LINEAR S CORRECT VERT SIZE VERT CENT	(1) Receive a circle pattern signal. (2) Select < V. LINEAR >(Veretical linearity), < S CORRECT > (S correction), < VERT SIZE >(Vertical amplitude), < VERT CENT >(Vertical centering) respectively. (3) Adjust to compensate for vertical distortion.
				
HORIZONTAL POSITION adjustment	Signal generator Remote control unit		HOR CEN	(1) Receive a circle pattern signal. (2) Select < HOR CEN >(Horizontal center). (3) Adjust to have the picture in the center of the screen.

Item	Measuring instrument	Test point	Adjustment part	Description
HORIZONTAL SIZE/ SIDE PIN adjustment	Signal generator Remote control unit		PARABOLA HOR WIDTH CORNER HOR PARAL EW TRAPEZ	(1) Receive a cross-hatch pattern signal. (2) Select < PALABOLA >(Parabola), < HOR WIDTH > (Horizontal width), < CORNER >(Top/bottom corner), < HOR PARAL >(Horizontal parallel), < EW TRAPEZ >(East/west trapezium. (3) Adjust these items to compensate for geometrical distortion.



SECTION 5
TROUBLE SHOOTING

This service manual does not describe TROUBLE SHOOTING.

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